
AIR QUALITY REPORT
2000
Kansas

A Message from the Director of the Division of Environment

Dear Reader,

As Kansas begins a new decade and millennium, the Kansas Department of Health and Environment (KDHE) will continue to work with the citizens of the state to maintain clean air. The 2000 Kansas Air Quality Report is one way that the department informs the citizens of Kansas, of not only the successes in air quality management, but also those areas that need improvement. KDHE will continue to rely on the support and cooperation of citizens, businesses, industry and federal, state, and local governments to address these areas of concern.

To maintain clean air across the state, it will take an active involvement by all Kansas citizens. Whether that means having your car tuned-up regularly, mowing your yard later in the evening during ozone alert days, or car-pooling to work, each person's contribution is essential. Although Kansas' overall air quality continues to be good, continued improvements will have to balance the needs of the environment with the needs of industry.

Everyone has a stake in keeping Kansas' air clean, and everyone can contribute to that continued success.

Ronald F. Hammerschmidt, Ph. D.
Director, Division of Environment

The Bureau of Air and Radiation's mission is to protect the public from the harmful effects of radiation and air pollution and conserve the natural resources of the state by preventing damage to the environment from releases of radioactive materials or air contaminants.

Cover Photo: Flint Hills pond.
This Page: Kansas wheat farm.
Photos by Tom Gross

KANSAS

2000 ANNUAL AIR QUALITY REPORT

Kansas Department of Health and Environment
Division of Environment
Bureau of Air and Radiation
Air Monitoring, Inventory and Modeling Section
Topeka, Kansas 66612-1366
(785) 296-6024

Bill Graves, Governor

Clyde D. Graeber, Secretary

Table of Contents

December 2001

FOREWORD

This 2000 report is issued by the Kansas Department of Health and Environment, Bureau of Air and Radiation, to inform the citizens of Kansas of current air quality issues throughout the state. The air program in the state of Kansas is a coordinated effort of the Division of Environment and four local air pollution control authorities. The Bureau of Air and Radiation works closely with the local agencies to ensure that Kansas is meeting Federal Clean Air Act requirements in accordance with the Federal Environmental Protection Agency guidelines. The Bureau has been designated as the responsible agency to obtain the statewide air quality monitoring data needed to determine the status of compliance with the National Ambient Air Quality Standards (NAAQS).

This report presents the results of measurements of pollutant levels in the ambient air, that portion of the atmosphere near ground level and external to buildings or other structures. Legal limitations on pollutant levels allowed to occur in the ambient air, or ambient air quality standards, have been established for six pollutants, each of which is discussed in more detail in this report. The six pollutants, referred to as criteria pollutants, are carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter. Under Section 108 of the Clean Air Act, the Administrator of the U.S. Environmental Protection Agency (EPA) has determined that these six pollutants may reasonably be anticipated to endanger public health and/or welfare and has issued criteria upon which the ambient standards for each have been established.

An essential component of air quality management in the state is the identification of (1) areas where the ambient air quality standards are being violated and plans are needed to reach attainment, and (2) areas where the ambient standards are being met, but plans are needed to ensure maintenance of acceptable levels of air quality in the face of anticipated population and industrial growth. The end result of this attainment/maintenance analysis process is the development of local and statewide strategies of stationary source permitting, enforcement, and transportation/air quality planning. This report presents the data that were EPA reportable in 2000.

This year's report also includes a new section on emission inventory issues and related data. The inventory is a summary of air pollutant emissions across the state during the preceding year.

Inquiries concerning this document and data collection should be directed to:

Kansas Department of Health and Environment
Division of Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366
(785) 296-6024

Photo by: Tom Gross, KDHE

Historical Development

Monitoring of the state's ambient air quality (i.e., level of contaminants found in the atmosphere) is carried out by the cooperative efforts of the U.S. Environmental Protection Agency (EPA), the Kansas Department of Health and Environment (KDHE), Unified Government of Wyandotte County-Kansas City, Kansas Health Department, Johnson County Environmental Department, Wichita-Sedgwick County Department of Community Health, and the Shawnee County Health Agency.

In September 1969, a statewide sampling network was established in thirty cities throughout Kansas. Twenty of these stations were equipped with high volume monitors that included a glass fiber filter to capture particulate matter (PM). The remaining sites used dust fall jars. These stations, under a state contract, were installed by a private contractor who also initially provided the necessary support maintenance and laboratory services.

In September 1970, KDHE took over the responsibilities for servicing the network that included providing laboratory analysis (except Kansas City), and data analysis for all the stations. During 1970, the air monitoring network was expanded with equipment purchased by state and local agencies in Kansas City, Topeka, and Wichita. By 1978, sufficient data had been collected at several sites to warrant discontinuation of sampling at those sites. KDHE continued to monitor air pollutants at other sites across the state during the 1980's and early 90's.

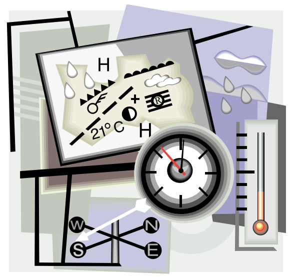
During 1998, KDHE reviewed and redesigned the entire state air monitoring system to accommodate the state's needs as well as meet the requirements specified by the EPA. A few monitors were relocated to new sites to operate in conjunction with the new $PM_{2.5}$ monitors. The current statewide network is designed to comply with federal requirements. In addition to equipment installed at permanent locations, KDHE also maintains eight sampling trailers that are moved to Special Purpose Monitoring sites as conditions warrant. These monitoring trailers are used at selected sites across the state to monitor air quality for special studies conducted by KDHE.

In the year 2000, the Bureau of Air and Radiation developed enhanced technical capabilities to prepare for participation in EPA's Ozone Mapping Project. During the ozone season, ozone measurements are retrieved electronically from monitoring sites by KDHE on an hourly basis. The data collected is then electronically submitted to the national Ozone Mapping System (OMS) at Research Triangle Park, NC. Updated monitoring data is used by OMS to generate maps that provide communities with current information about ozone pollution in an easy-to-understand, color-coded format. The color-coded contours of these maps indicate the relative level of health concern based upon the current ozone concentrations. Additional information and maps generated by OMS can be found on the web at www.epa.gov/airnow.

Although the overall quality of Kansas air in 2000 was good, KDHE and the people of Kansas face several challenges in the new millennium as population and industry in the state continue to grow. KDHE will continue to rely on the support and cooperation of citizens, businesses, industry, and federal, state, and local governments to address these challenges and preserve our clean air.

The Kansas State Legislature adopted the first air quality statute in 1967.

Kansas Weather



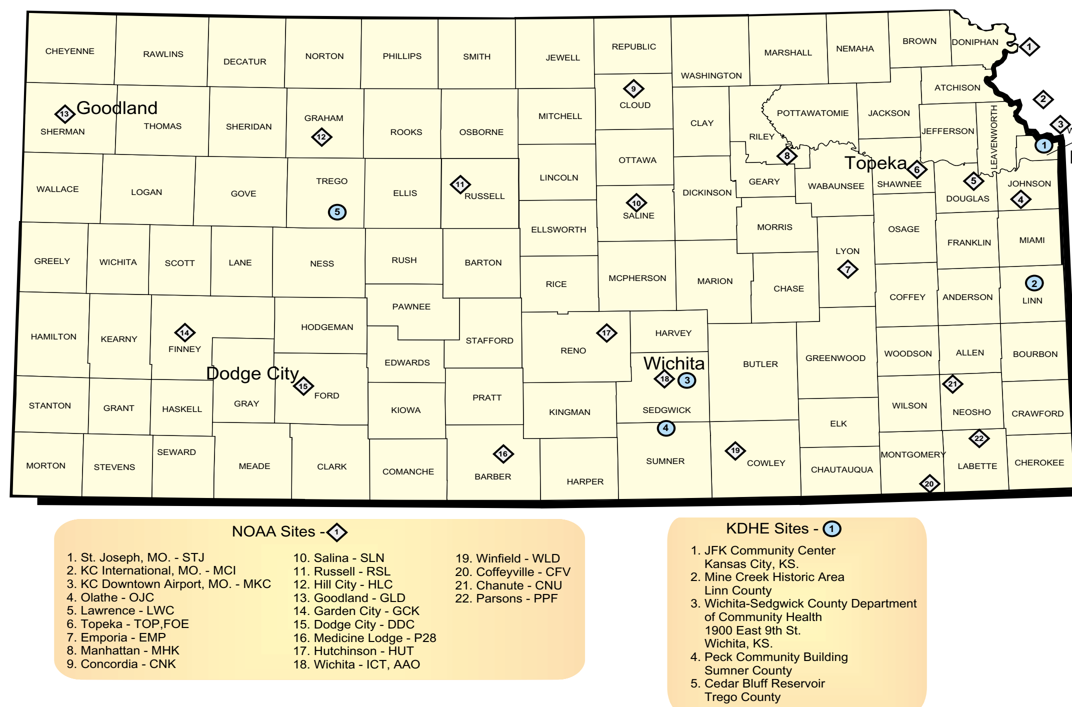
No discussion on the quality of Kansas air can be complete without talking about the effects the weather of Kansas has on our environment.

Because of the state's geographical location in the middle of the country, Kansans experience four distinct seasons. Cold winters and hot, dry summers are the norms for the state. The other constant in Kansas weather is the wind. Kansas ranks high in the nation in average daily wind speed. In 2000, the average wind speed across the state was a little over 11 miles per hour (m.p.h.). The predominant wind direction was from the south. These factors combine to affect the two major areas of air quality concern in the state, ozone and particulate matter.

The air pollution meteorology problem is a two-way street. The presence of pollution in the atmosphere may affect the weather and climate. At the same time, the meteorological conditions greatly affect the concentration of pollutants at a particular location, as well as the rate of dispersion of pollutants.

The ground level ozone or smog problem develops in Kansas during the period from April through October. Ozone is formed readily in the atmosphere by the reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) in the presence of heat and sunlight, which are most abundant in the summer months. Kansas tends to see ozone episodes in the summer when high pressure systems stagnate over the area which leads to cloudless skies, high temperatures and light winds. Another element of these high pressure systems that contribute to pollution problems is the development of upper air inversions. This will typically "cap" the atmosphere near the surface and not allow the air to mix and disperse pollutants. Therefore,

Figure 1 - Kansas Area Weather Stations



pollution concentrations may continue to increase near the ground from numerous pollution sources since the air is not mixing within and above the inversion layer.

The other pollutant of concern mentioned earlier is particulate matter. Kansas has a long history of particulate matter problems caused by our weather. The Great Dust Bowl of the 1930's was caused, in part, by many months of minimal rainfall and high winds. This natural source of PM pollution, although not as bad as in the 1930's, is still a concern today as varying weather conditions across the state from year to year cause soil to be carried into the air and create health problems for citizens of Kansas.

Figure 2 - Dust storms 1930's and 2000.

The wind roses on page nine are examples of wind conditions experienced at four National Weather Service sites across the state in 2000. These four sites from different parts of the state show a representation of the wind speeds and directions for 2000. The wind speeds on the graphs are reported in knots (1 knot = 1.15 miles per hour). The predominant wind direction across the state of Kansas in 2000 was from the south. This follows in step with Kansas' historical meteorological wind data.

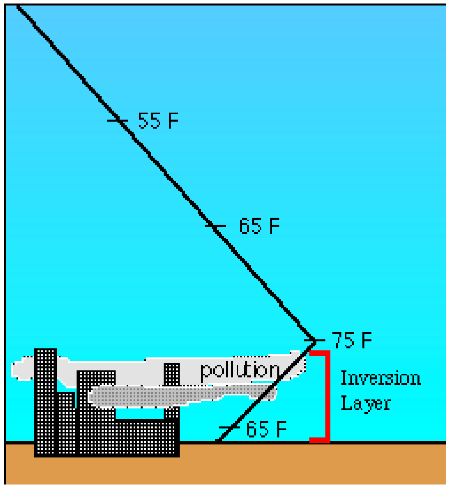
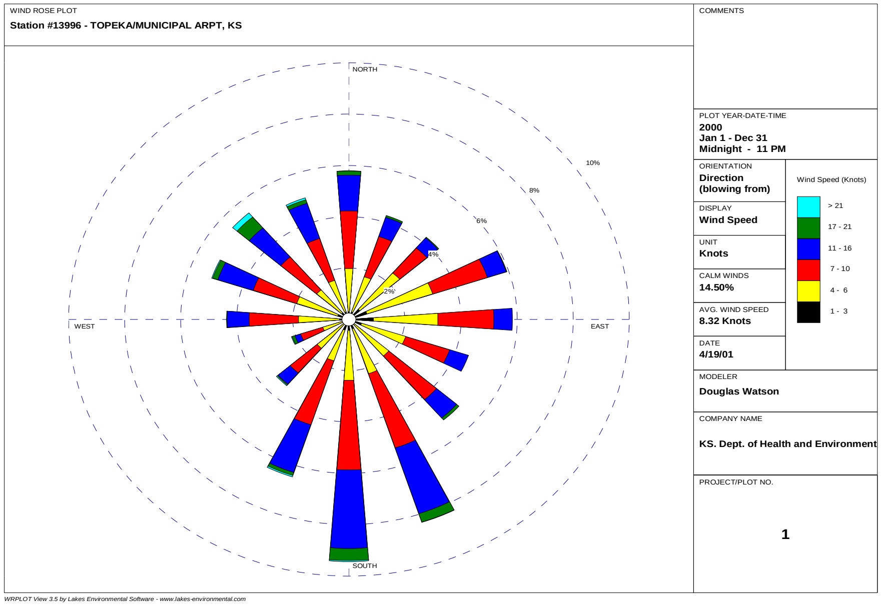
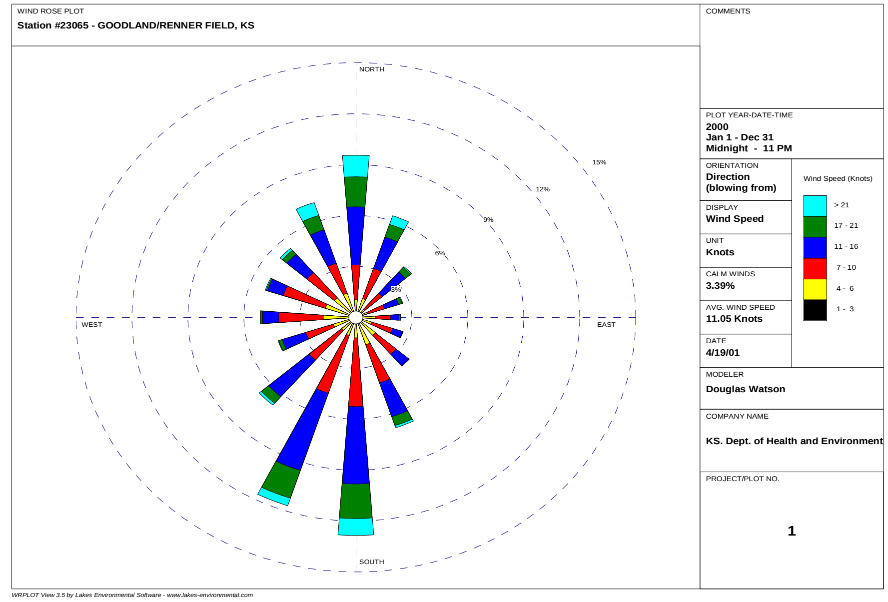
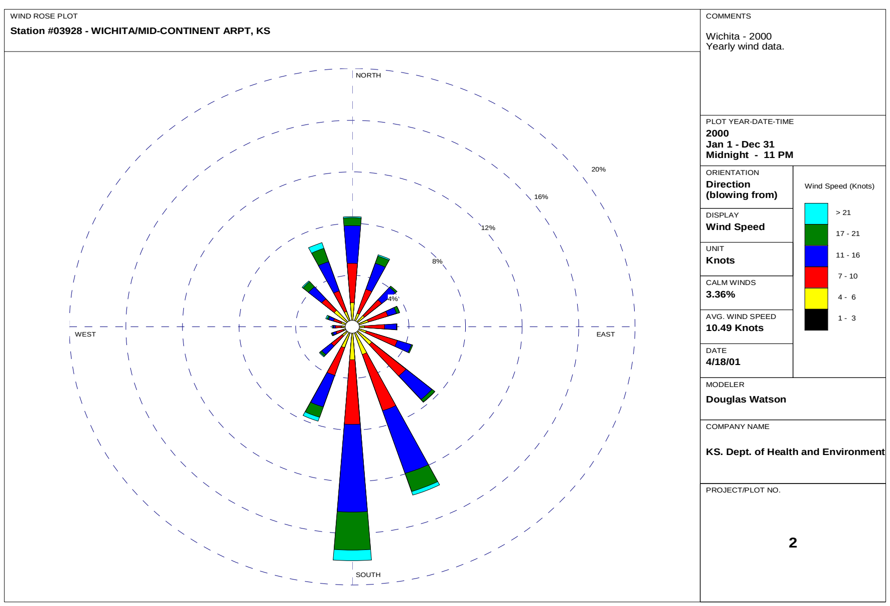


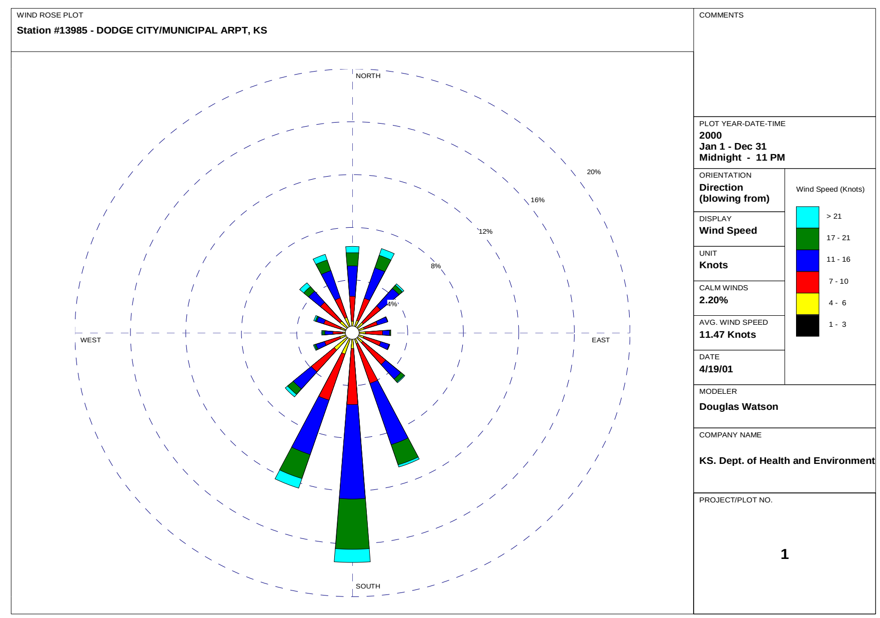
Figure 3 - Example of inversion layer.

Another source of PM pollution that will be discussed in more detail later in this report is anthropogenic, generated by processes that have been initiated by humans. These particles may be emitted directly by a source or formed in the atmosphere by the transformation of gaseous precursor emissions such as sulfur dioxide (SO_2) and NO_x. Meteorological conditions also affect how these man-made sources of PM form and disperse. One factor that is common in Kansas that can lead to high pollution episodes is a surface inversion. Like upper air inversions, warmer air just above the surface of the earth forms a surface inversion and caps all pollutants below it. These inversions are mainly caused by the faster loss of heat from the surface than the air directly above it. In Kansas, surface inversions are more common in the winter months, but can occur during any season and lead to pollution problems. Figure 3 shows a simplified version of how a surface inversion would appear in a temperature profile of the atmosphere. The figure shows how the warm air aloft can trap the pollution at the surface.









On the average, Kansas experiences 226 sunny days per year.

Ambient Air Monitoring Network

Within the Kansas Ambient Air Monitoring Network, certain sites have been designated by the United States Environmental Protection Agency (EPA) as National Air Monitoring Stations (NAMS) or State and Local Air Monitoring Stations (SLAMS). NAMS are considered a subset of SLAMS. Data obtained at NAMS locations are used by EPA to determine national air pollution trends. Data collected at both NAMS and SLAMS locations are compared to National Ambient Air Quality Standards (NAAQS), and used by the state of Kansas and EPA to determine attainment status for criteria pollutants. SLAMS sites are developed by KDHE and its local partner agencies to enhance monitoring to meet national, state, and local needs.

Ambient air monitoring sites are scattered throughout the state. Their placement is based upon clearly defined EPA siting criteria that consider attributes such as population densities and the degree to which data collected at the site accurately represent the air quality in the region. Data from monitoring sites are collected by KDHE and local agency staff, reported to the EPA and are used for the evaluation of air quality and for the regulatory decision making process.

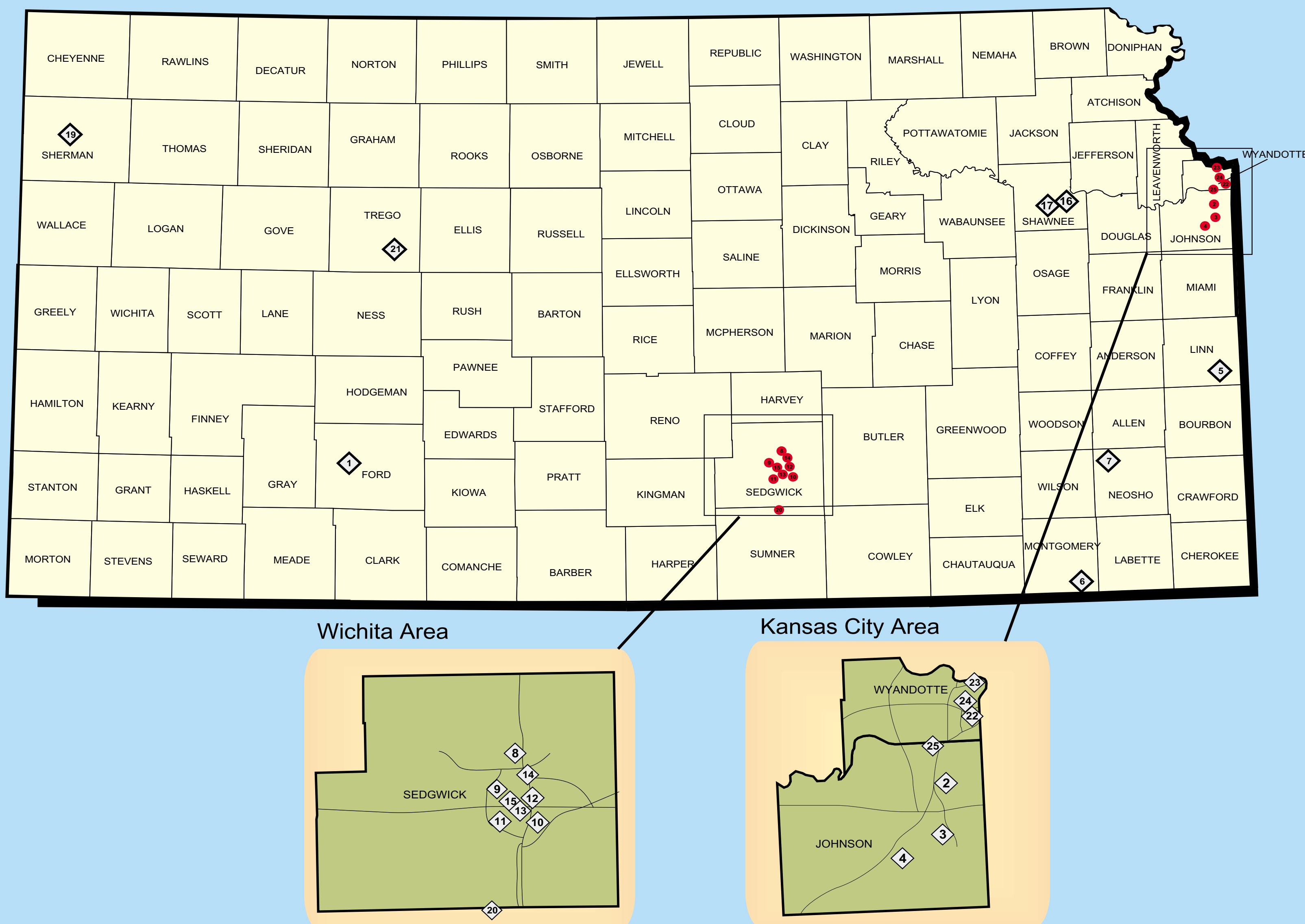
The Kansas Ambient Air Monitoring Network for 2000 consisted of 25 sampling sites (**see map, Pg. 11**) at which specialized instruments were employed to measure the following criteria pollutants:

- √ PM_{10} at 13 sites
- √ $PM_{2.5}$ at 13 sites
- √ Sulfur dioxide (SO_2) at 4 sites
- √ Ozone (O_3) at 6 sites
- √ Carbon monoxide (CO) at 6 sites
- √ Nitrogen dioxide (NO_2) at 3 sites

Air Quality Monitoring Site - Kansas City

Sites installed by the Department in recent years consist of meteorological stations and multiple monitors that detect different air pollutants. The composition and the configuration of the Kansas Ambient Air Monitoring Network varies with changing federal and state requirements. A complete description of all long-term Kansas Ambient Air Monitoring sites operated by KDHE in 2000 and previous years is available from Bureau of Air and Radiation.

Air Quality Monitoring Sites In Kansas



Monitoring Site Locations

Site #	AIRS ID	City/Co.	Address	TSP	PM_{10}	CPM_{10}	$PM_{2.5}$	$CPM_{2.5}$	CO	SO_2	O_3	NO_x	Site #	AIRS ID	City/Co.	Address	TSP	PM_{10}	CPM_{10}	$PM_{2.5}$	$CPM_{2.5}$	CO	SO_2	O_3	NO_x
1	057-0001	Dodge City	2100 First		SPM								14	173-1012	Wichita	3600 N. Hydraulic		Coll.	NAMS						
2	091-0007	Overland Park	Overland Park Judicial Ctr. 85th & Antioch				SLAMS +Coll.						15	173-1014	Wichita	Douglas & Main						SPM			
3	091-0008	Overland Park	Oxford Middle School				SLAMS						16	177-0010	Topeka	Robinson Middle School		SPM		SLAMS					
4	091-0009	Olathe	Black Bob Elem. School				SLAMS						17	177-0011	Topeka	McClure Elem. School				SLAMS					
5	107-0002	Linn Co.	Mine Creek Historic Site				SLAMS (Trans.) +Coll.	SPM	SPM	SPM	SPM	SPM	18	177-0012	Topeka	Washburn Univ.		SPM		SPM	SPM				
6	125-0006	Coffeyville	Union & East North			SPM				SPM $+H_2S$			19	181-0001	Goodland	1010 Center		SPM							
7	133-0002	Chanute	1500 West 7th	SPM	SPM								20	191-0002	Peck	Peck Community Building				SLAMS (Trans)		SPM	SPM	SPM	SPM
8	173-0001	Park City	200 East 53rd North								NAMS		21	195-0001	Trego Co.	Cedar Bluff Resv.					SPM			SPM	
9	173-0007	Wichita	13th & St. Paul		SLAMS								22	209-0015	K.C.	420 Kansas		NAMS							
10	173-0008	Wichita	G. Washington & Skinner			SLAMS	SLAMS						23	209-0020	K.C.	444 Kindelberger		NAMS +Coll.							
11	173-0009	Wichita	Pawnee and Glenn			SLAMS	SLAMS						24	209-0021	K.C.	JFK Comm. Center				SLAMS +Coll.	SPM	SLAMS	NAMS	SLAMS	SPM
12	173-0010	Wichita	1900 East 9th Health Dept.			SPM	SLAMS +Coll.		SLAMS		NAMS		25	209-0022	K.C.	Midland Trail Elem.				SLAMS					
13	173-1003	Wichita	Topeka and Lewis						SLAMS																

* All monitors generate data reported to EPA AIRS
SPM: Special Purpose Monitor
CPM_{10}: Continuous PM_{10}
$CPM_{2.5}$: Continuous $PM_{2.5}$

Coll.: Collocated
SLAMS: State and Local Air Monitoring Station
NAMS: National Air Monitoring Station

There are a total of 50 air sampling monitors in operation across the state.

Standards and Monitoring Results

The Clean Air Act of 1970 required the United States Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for each air pollutant anticipated to endanger public health or welfare. Pollutants in this category, termed criteria pollutants, included: total suspended particulate, lead, sulfur dioxide, carbon monoxide, ozone, and nitrogen dioxide.

In 1987, total suspended particulate (TSP) was replaced by particulate matter less than 10 microns (1/100 of a millimeter) in diameter (PM_{10}). On July 18, 1997, both the ozone and particulate standards were revised by the EPA. In addition, a new standard for particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$) was introduced. However, the new standards were challenged in court. In May 1999, the U.S. Court of Appeals for the District of Columbia Circuit declared that the new standards are not enforceable. Therefore, the standards could not be implemented at that time. In February of 2001, the Supreme Court ruled in favor of EPA and remanded the case back to the D.C. Court of Appeals for a final decision.

The current Air Quality Standards are summarized by pollutant in the table on page 14. As shown in the table, there are two types of air quality standards. The primary standard is designed to protect the public health with an adequate safety margin. Permissible levels were chosen to protect the health of the most susceptible individuals in a population, including children, the elderly, and those with chronic respiratory ailments. The secondary standard is designed to protect public welfare or ensure quality of life. Air quality conditions described by the secondary standard may be the same as the primary standard and are chosen to limit economic damage as well as harmful effects to buildings, plants, and animals.

Photo by: Tom Gross, KDHE

During 2000, the Kansas Ambient Air Monitoring Program measured five of the six criteria air pollutants. Monitoring for the sixth, lead, was phased out during 1998, due in large part to the significant drop in measured values caused by the elimination of leaded gas.

Statewide summaries for each of the five criteria pollutants measured in 2000 appear below. Information for each pollutant is included in the narratives that accompany the pollutant graphs.

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is a colorless, nonflammable gas that enters the atmosphere primarily from the combustion of sulfur-laden fossil fuels such as coal and oil. Other man-made sources of SO_2 emissions include commercial production of sulfuric acid and fuel combustion in vehicles. Most naturally emitted SO_2 results from hydrogen sulfide (H_2S) produced during biological decay of organic matter.

High concentrations of SO_2 can result in temporary breathing problems for asthmatic people who are active outdoors.

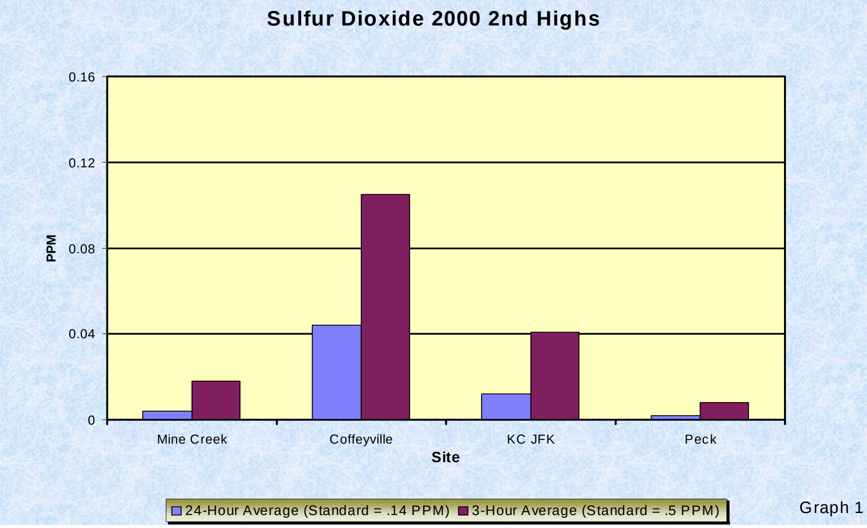
Sulfur Dioxide is a pulmonary irritant that generally affects the upper respiratory system.

National Ambient Air Quality Standards

Criteria Air Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon Monoxide	One-hour maximum[a]	35 ppm[c] (40 mg/m[3b])	
	Eight-hour maximum[a]	9 ppm (10 mg/m³)	
Lead	Quarterly Average	1.5 ug/m[3d]	Same as Primary Standard
Nitrogen Dioxide	Annual Arithmetic Mean	0.053 ppm (100 ug/m³)	Same as Primary Standard
Ozone *	One-hour average[a]	0.12 ppm (235 ug/m³)	Same as Primary Standard
	Eight-hour average[e]	0.08 ppm (157 ug/m³)	Same as Primary Standard
Particulate Matter * (PM_{10})	Annual Arithmetic Mean 24-hour average[f]	50 ug/m³ 150 ug/m³	Same as Primary Standard
Particulate Matter * ($PM_{2.5}$)	Annual Arithmetic Mean[g] 24-hour average[h]	15 ug/m³ 65 ug/m³	Same as Primary Standard
Sulfur Dioxide	24-hour maximum[a]	0.14 ppm (365 ug/m³)	
	Annual Arithmetic Mean	0.03 ppm (80 ug/m³)	
	Three-hour Maximum[a]		0.5 ppm (1300 ug/m³)

[a] Not to be exceeded more than once a year for primary and secondary standards
[b] mg/m³ = milligrams per cubic meter
[c] ppm = parts per million
[d] ug/m³ = micrograms per cubic meter
[e] Established for a three-year average of the fourth highest daily maximum concentration
[f] Established for a three-year average of the 99th percentile of data
[g] Established for a three-year average
[h] Established for a three-year average of the 98th percentile of data
* Pending the outcome of court decisions.

In what year was the Federal Clean Air Act last amended? a. 1989 b. 1978 c. 1990 d. 1995 (Answers on inside back cover).



Graph 1

Short-term exposures of asthmatic individuals to elevated SO_2 levels while at moderate exertion may result in breathing difficulties that may be accompanied by such symptoms as wheezing, chest tightness, or shortness of breath.

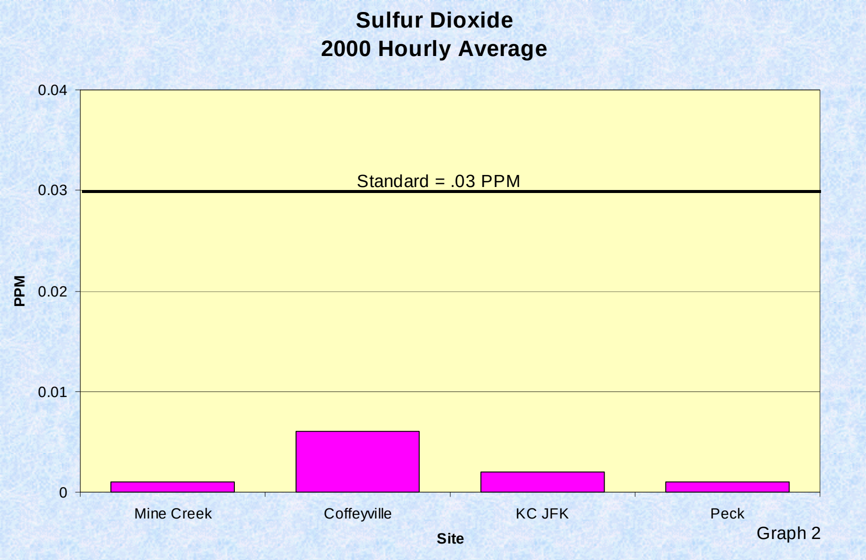
SO_2 can directly affect human health and the environment, or cause indirect effects upon conversion to sulfuric acid in the atmosphere. The leaves of many species of trees and other plants, including spinach, lettuce, and other leafy vegetables may be injured by SO_2 exposure. Acidification of ponds and lakes due, at least in part to the effects of sulfuric acid, can have major detrimental impact on aquatic life. Sulfuric acid also damages limestone, marble, roofing slate, and mortar.

In Kansas, transport of SO_2 beyond the vicinity of its sources is usually insignificant. Typically, SO_2 plumes are well dispersed and contribute only to background concentrations.

Sulfate particles formed by the oxidation of SO_2 are, however, subject to long-range transport in the atmosphere. In addition to their potential adverse health effects, these particles, generally less than 1.0 micron in diameter, are effective in scattering visible light, thus producing haze and reducing visibility.

RESULTS:

The primary air quality standard for SO_2 is expressed in three forms: an hourly average value; a 3-hour value not to be exceeded more than once per year; and a 24-hour value not to be exceeded more than once per year. Graph number 1 shows the 2nd highest 3-hour and 24-hour average results for the four sites. Graph number 2 shows the hourly average value concentrations for the four sites where SO_2 was monitored in Kansas during 2000. All four sites were well below the hourly average standard, 3-hour, and the 24-hour standard for SO_2. The Coffeyville site shows the highest concentration for all forms of the standard due to the proximity of the site to industrial sources of SO_2.



Graph 2

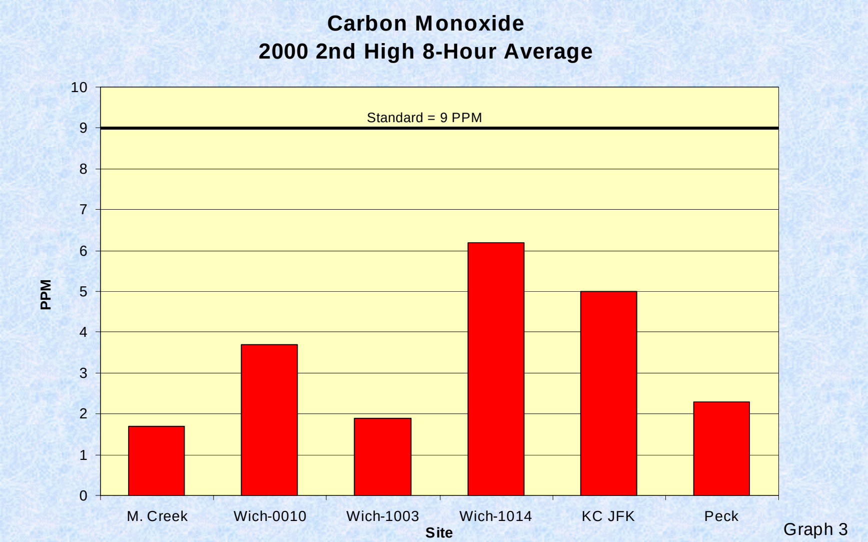
Carbon Monoxide (CO)

Carbon monoxide (CO) is a colorless, odorless, tasteless gas that is emitted into the atmosphere from both natural and man-made sources. Carbon monoxide enters the bloodstream through the lungs and reduces oxygen delivery to the body's organs and tissues. Symptoms of exposure to CO include dizziness, headache, and lethargy. Prolonged exposure to high levels of CO causes severe physical and pathological changes, and ultimately death.

The major natural source of CO is oxidation of methane. Other natural sources include the oceans; plant synthesis and degradation; oxidation of terpenes (from certain plant species); and forest or prairie fires. On a global scale, natural sources account for nearly 90% of CO emissions. Man-made CO is emitted chiefly as a product of combustion of gasoline, wood, natural gas, or coal. Elevated CO levels occur primarily in urban areas as a result of emissions from motor vehicles. Other sources include fuel combustion for industrial and utility boilers, industrial process losses, and open burning.

Carbon monoxide from combustion sources is formed by incomplete burning of carbon-based fuel. Motor vehicles operating at low idle speeds tend to emit the highest levels of CO. As vehicle speed increases, emission of CO generally decreases.

Automotive carbon monoxide emissions also vary with ambient air temperature. Engines operate less efficiently in lower air temperatures, thus producing higher CO emissions. Carbon monoxide emissions tend to disperse due to the small amount of emissions from each engine and widespread nature of the emissions. Transport is not, therefore, considered an important factor in the occurrence of elevated ambient air concentrations beyond urban source areas.



Graph 3

CO emissions can create localized problems in areas prone to traffic congestion. Consideration of air quality in transportation planning at the state and county levels is necessary to prevent harmful concentrations of CO from accumulating in such areas.

RESULTS:

The primary air quality standard for CO is expressed in two forms: an 8-hour average value; and a 1-hour average value. Both are not to be exceeded more than once per year. Graph number 3 shows the 2nd highest 8-hour average concentrations for the six sites where CO was monitored in Kansas during 2000. All six sites were well below the 8-hour standard. The one hour monitoring results ranged from 5% to 20% of the standard. A graph for these results is not included in this report.

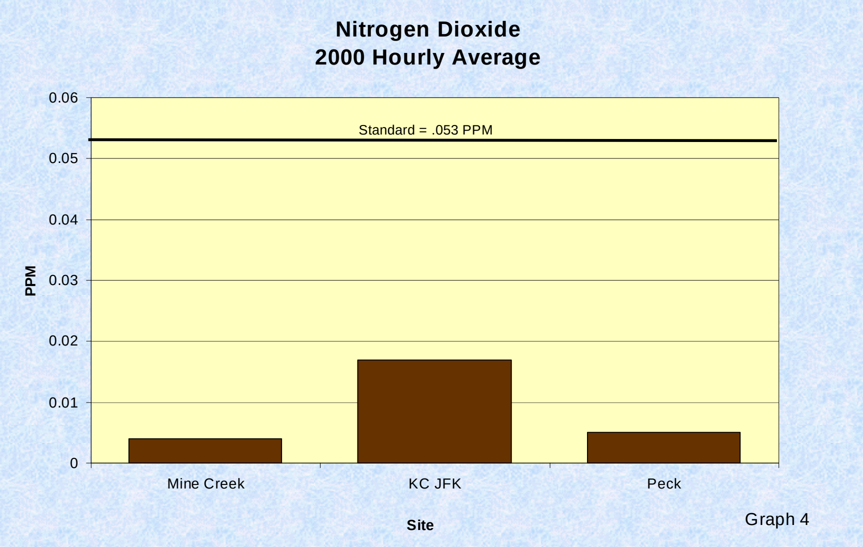
CO is a component of motor vehicle exhaust, which contributes about 60 percent of all CO emissions nationwide.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2) is one of the oxides of nitrogen that contribute to smog formation in urban areas. At a concentration of 1 ppm, NO_2 appears yellow-brown. In the atmosphere, NO_2 is partly converted to nitric acid and various particles that can also have adverse health and welfare effects.

Nitrogen dioxide is a pulmonary irritant that generally affects the upper respiratory system. The primary danger presented by oxides of nitrogen at concentrations found in urban areas, however, is associated with their role in the photochemical reactions that lead to ozone formation.

Natural sources of NO_2 include biological processes in soil and atmospheric oxidation of ammonia. On a global scale, NO_2 emissions from natural sources are approximately 10 times greater than emissions from man-made sources. This has little relevance to the problem of NO_2 and ozone formation because natural and man-made sources are generally separated geographically, with man-made sources concentrated in more populated areas. The major source of man-made NO_2 is fuel combustion in motor vehicle engines and utility or industrial boilers. Oxides of nitrogen are formed during high-temperature combustion by oxidation of atmospheric nitrogen, as well as (to a lesser extent) nitrogen in the fuel being burned. Most nitrogen oxides produced during the combustion process are in the form of nitric oxide(NO).



Graph 4

What Can I Do?

Here's how you can help protect clean air in Kansas.

On the road.......

- Take the bus, walk or ride a bike.
- Carpool to work.
- Drive your newest car... It has better air pollution controls.
- Keep your engine tuned.
- Check your emissions control system.
- Have your gas cap pressure checked for leaks.

Nitrogen oxides emitted from motor vehicles tend to disperse due to the small amount of emissions from each engine and the widespread nature of the emissions. Dispersion occurs more slowly when oxides of nitrogen are emitted from large stationary sources such as power plants with tall stacks, since the plume of hot gases rises and undergoes a gradual spreading due to winds and turbulence. In urban areas, NO_2 emitted near ground level becomes involved in ozone formation.

RESULTS:

The primary air quality standard for NO_2 is expressed in the form of an annual arithmetic mean. Graph number 4 shows the monitoring results for the three sites where NO_2 was monitored during 2000. All sites were well below the primary air quality standard of 0.053 ppm. The annual average concentration recorded at the Kansas City monitoring site was higher than the Mine Creek and Peck site due to its location in a metropolitan area.

Ozone (O_3)

Ground-level ozone (the primary constituent of smog) continues to be a pervasive pollution problem throughout many areas of the United States, including Kansas. Ground-level ozone is not emitted directly into the air but is formed by an atmospheric reaction, usually during hot summer weather. Ozone also plays a positive role. Stratospheric ozone, often referred to as "the ozone layer," prevents the harmful portion of the sun's ultraviolet radiation from reaching the surface of the earth. In this context, ozone is beneficial and protective of life on earth.

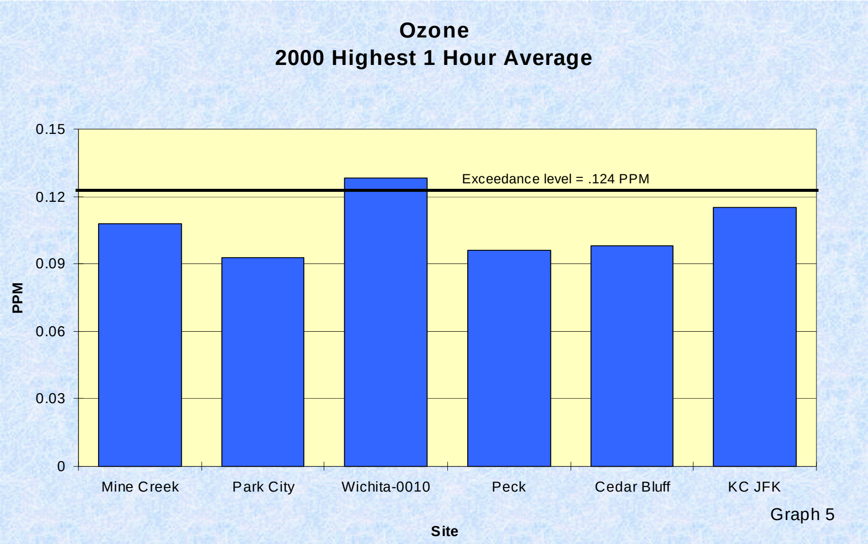
Repeated exposures to ground level ozone can make people more susceptible to respiratory infection, resulting in lung inflammation. Other health effects attributed to ozone exposures include decreases in lung function and increased respiratory symptoms such as chest pain and cough. These effects generally occur while individuals are engaged in moderate or heavy exertion. Persons who are active outdoors during the summer when ozone levels are at their highest are most at risk of experiencing such effects. Other at-risk groups include individuals with pre-existing respiratory disease such as asthma and chronic obstructive lung disease.

Ozone also affects vegetation and ecosystems, leading to reductions in agricultural and commercial forest yields, reduced growth and survivability of tree seedlings, and increased plant susceptibility to disease, pests, and other environmental stresses (e.g., harsh weather). Some plants such as white pine, wheat, tomatoes, milkweeds, soybeans, and alfalfa are especially sensitive to ozone and show damage at low levels. From the standpoint of crops critical to the Kansas economy, ongoing research indicates that ozone can cause significant reduction in yields of crops such as wheat and soybeans.

Ozone is created by a complex series of chemical reactions in the atmosphere between NO_x and volatile organic compounds (VOCs) in the presence of sunlight. Man-made sources of oxides of nitrogen are emitted primarily from combustion sources. Man-made sources of VOCs include fuel combustion, fuel evaporation, painting, industrial and commercial applications using solvents. Natural sources of ozone precursors include VOCs emitted by certain plants and natural decay of biota in marshlands.

The rate of ozone formation is dependent upon temperature and intensity of sunlight. Ozone presents the greatest problem in urban areas on calm, hot, sunny summer days. In Kansas, the "ozone season" is considered to last from April 1 through October 31. Recent studies have demonstrated that ozone and its precursors may be transported through the atmosphere to add to problems in locations relatively far from their origin.

Where does ozone provide a protective layer high above the earth? a. mesosphere b. cosmosphere c. omnisphere d. stratosphere(Answer on inside back cover).



Graph 5

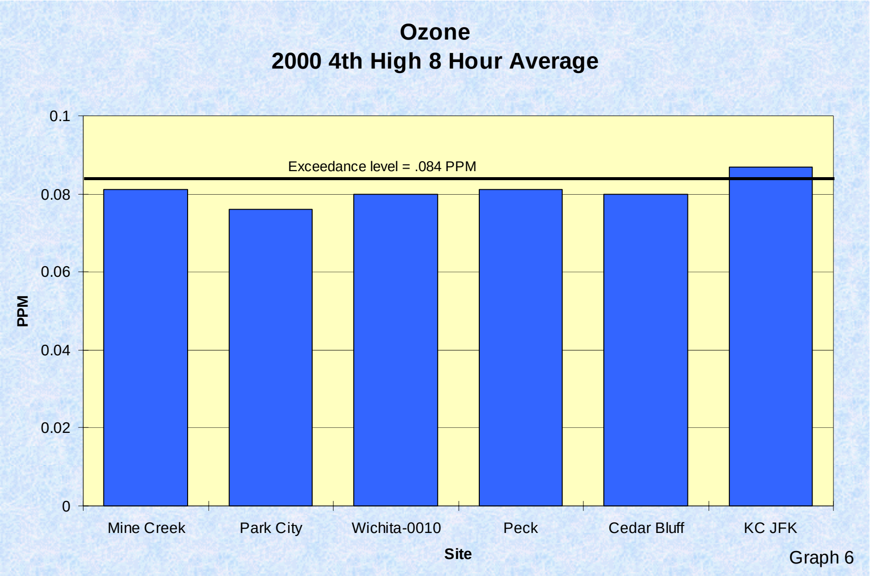
RESULTS:

The primary air quality standards for ozone are concentrations over either 8-hour or 1-hour durations. The 8-hour standard is expressed in the form of the three-year average of each year's 4th highest concentration. The 8-hour standard is 0.08 ppm. The standard is not exceeded until monitored values exceed 0.084 ppm, allowing for upward rounding. The 1-hour standard is not to be exceeded more than once per year on average. The 1-hour standard is 0.12 ppm. The standard is not exceeded until monitored values exceed 0.124 ppm, allowing for upward rounding.

Photo by: EPA

When evaluating ozone monitoring results, it is important to consider two points. First, monitoring results are rounded so a value can be slightly above the standard and not be considered a violation. Second, ozone values higher than the standard for one year do not always indicate a violation of the primary air quality standard. These determinations are made on the basis of three years of data.

Graph number 5 shows the highest 1-hour concentrations for the six sites where ozone was monitored in Kansas during 2000. With the exception of the Wichita site, the 1-hour results are below the standard. Graph number 6 shows the 4th highest 8-hour average concentrations for the same six sites. The 8-hour results show that all of the monitors are very close to or above the standard. Some of the ozone monitoring results will be discussed in greater detail in the sections of this publication dedicated to the Kansas City and Wichita metropolitan areas.



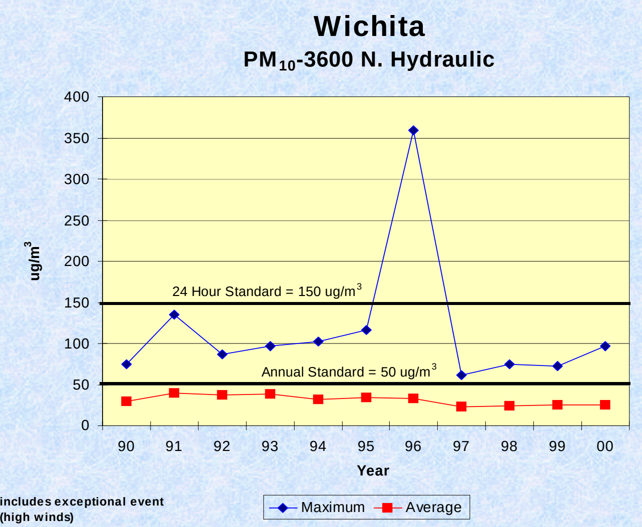
Graph 6

Particulate Matter (PM)

Particulate matter (PM) is the term used for a mixture of solid particles and liquid droplets found in the air. These particles come in a wide range of sizes. Some are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with a microscope. Particulate matter originates from many different stationary and mobile sources as well as from natural sources. Airborne particulate matter is designated as either PM_{10} or $PM_{2.5}$, also referred to as "fine" particulate matter. These designations are based on the diameter of the particles.

PM_{10}- Particulate matter with a diameter of less than or equal to 10 microns is designated as PM_{10}. Burning of wood, diesel and other fuels, and open burning contribute particulate matter to the atmosphere, generally in the form of smoke.

Certain industrial processes also generate PM_{10}. In addition, dust from agricultural operations, unpaved roads, and dust



1996 includes exceptional event data (high winds)

Graph 7

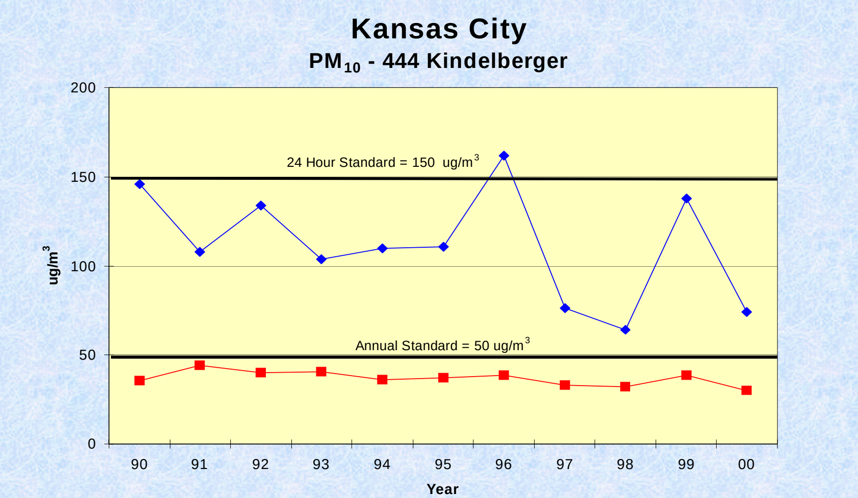
Photo by: Fred Diver, KDHE

storms contains a significant proportion of PM_{10}. Some areas within the state of Kansas experience occasional severe episodes of blowing dust or dust storms.

Inhalation of PM_{10} can cause irritation of the nose and throat, bronchitis, and damage to lung tissue. Children, elderly persons, and individuals with impaired lung or heart function are especially susceptible to the adverse health effects associated with inhalation of airborne particulate matter.

Particulate matter suspended in the atmosphere also reduces visibility. Particulate matter can be transported great distances in the atmosphere. The smaller the particle, the greater the potential for aerial transport. During the "Dust Bowl Days" of the 1930s, dust clouds originating in Kansas and neighboring states were observed on the East Coast of the United States.

In addition to health problems, PM is the major cause of reduced visibility in many parts of the United States.



1996 maximum was not a violation since the monitor was sampling every other day.

Graph 8

During the first calendar quarter of 1996, high winds coupled with extremely dry soil conditions caused exceedances of the air quality standard for PM_{10} in Morton and Sedgwick Counties.

RESULTS:

Graph number 7 on page 20 shows the 11-year trend for PM_{10} monitored at the PM site at 3600 N. Hydraulic in Wichita. The annual average values have been stable over the eleven-year period and well below the annual standard. The year 1996 shows a high 24-hour PM_{10} value due to extremely dry weather and high winds noted above.

Graph number 8 shows the 11-year trend for PM_{10} at 444 Kindelberger in Kansas City. The annual average values also have been stable over the eleven-year period at this site. These values are also well below the annual standard. The year 1996 also shows an increase in PM values but they are not as pronounced as the values recorded at the Wichita site. Wind values were not as strong in the Kansas City area.

$PM_{2.5}$ - In 1997, EPA added a new particulate matter standard for particles with a diameter of less than or equal to 2.5 microns ($PM_{2.5}$). This change was based on concerns that smaller particles travel deep into the lungs and cause or aggravate respiratory problems such as asthma, and chronic bronchitis. Children, the elderly, and people with lung or heart disease are considered to be especially susceptible to the adverse health effects of airborne fine particulate matter.

Fine particles ($PM_{2.5}$) result from fuel combustion in motor vehicles, power generation, and industrial facilities, as well as from residential fireplaces and wood stoves. Research has shown that gases such as sulfur oxide and SO_2, NO_x, and VOC interact with other compounds in the air to form fine particles.

RESULTS:

The $PM_{2.5}$ standards issued by EPA in 1997 were set for two time periods, an annual average and a 24-hour average. The annual average standard was set at 15 micrograms per cubic meter (μg/m³), while the 24-hour average standard was set at 65 μg/m³. The $PM_{2.5}$ monitoring data will be evaluated over a three-year period to determine whether problems exist. This three-year period began in January 1999. Initial indications are that some urban areas may exceed the annual $PM_{2.5}$ NAAQS. With only two years of $PM_{2.5}$ data complete, it is too early to gauge the impact the new standard will have on Kansas. The table on page 22 lists the values of PM_{10} and $PM_{2.5}$ that were recorded across the state in 2000.

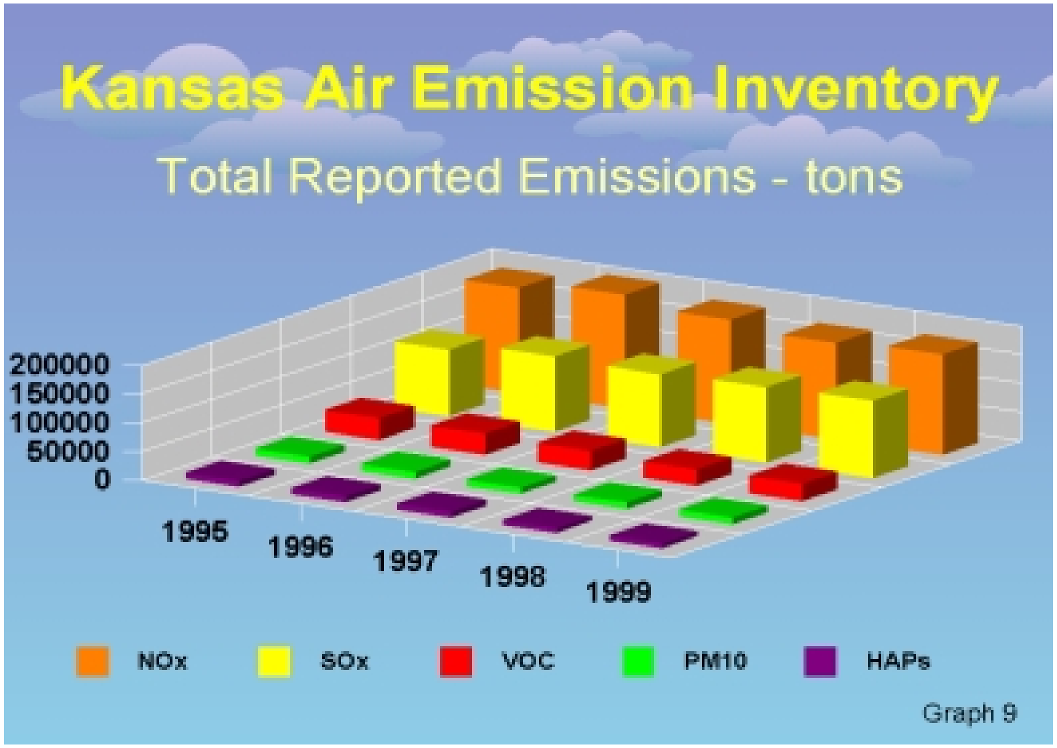
Particulate Matter Data - 2000

	PM_{10}		$PM_{2.5}$			PM_{10}		$PM_{2.5}$	
SITE	MAXIMUM (STD. = 150ug/m3)	AVERAGE (STD. = 50ug/m3)	98TH PERCENTILE (STD. = 65ug/m3)	AVERAGE (STD. = 15ug/m3)	SITE	MAXIMUM (STD. = 150ug/m3)	AVERAGE (STD. = 50ug/m3)	98TH PERCENTILE (STD. = 65ug/m3)	AVERAGE (STD. = 15ug/m3)
KANSAS CITY, KS / JOHNSON COUNTY					**WICHITA**				
420 KANSAS	138	37	N/A	N/A	13TH AND ST. PAUL	108	26	N/A	N/A
FAIRFAX	74	30	N/A	N/A	G. WASHINGTON & SKINNER	96	23	25.9	11.8
JFK COMM. CENTER	N/A	N/A	28.0	13.4	PAWNEE & GLENN	83	22	25.3	11.5
MIDLAND TRAIL ELEM.	N/A	N/A	26.2	11.0	HEALTH DEPARTMENT	95	24	26.4	11.9
OVERLAND PARK JUDICIAL CENTER	N/A	N/A	25.2	11.4	3600 N. HYDRAULIC	97	25	N/A	N/A
OXFORD MIDDLE SCHOOL	N/A	N/A	25.8	11.3	PECK (SUMNER CO.)	N/A	N/A	23.0	10.5
BLACK BOB ELEM. SCHOOL	N/A	N/A	25.4	11.1					
TOPEKA					**OTHER SITES**				
ROBINSON MIDDLE SCHOOL	51	20	23.5	10.7	DODGE CITY	49	22	N/A	N/A
WASHBURN UNIVERSITY	54	21	22.2	10.7	COFFEYVILLE	80	24	N/A	N/A
MCCLURE ELEM. SCHOOL	N/A	N/A	22.7	10.8	CHANUTE	82	26	N/A	N/A
					GOODLAND	79	25	N/A	N/A
					MINE CREEK (LINN CO.)	N/A	N/A	24.8	10.4

Ozone is formed by the interaction of volatile organic compounds and: a. NOx b. SOx c. ROcks

Emission Inventory

This 2000 Emission Inventory has been prepared by the Bureau of Air and Radiation to summarize the results of the calendar year 2000 Kansas point source emission survey. An emission inventory is a summary of air pollutant emissions covering a geographic area for a specific time period. The Bureau annually collects new information regarding the quantities of air pollutants emitted from sources in the state. The inventory is conducted by sending out surveys to facilities with Class I and Class II permits. The surveys for the preceding calendar year are mailed to facilities in February with the forms due back to the Bureau by June 1.



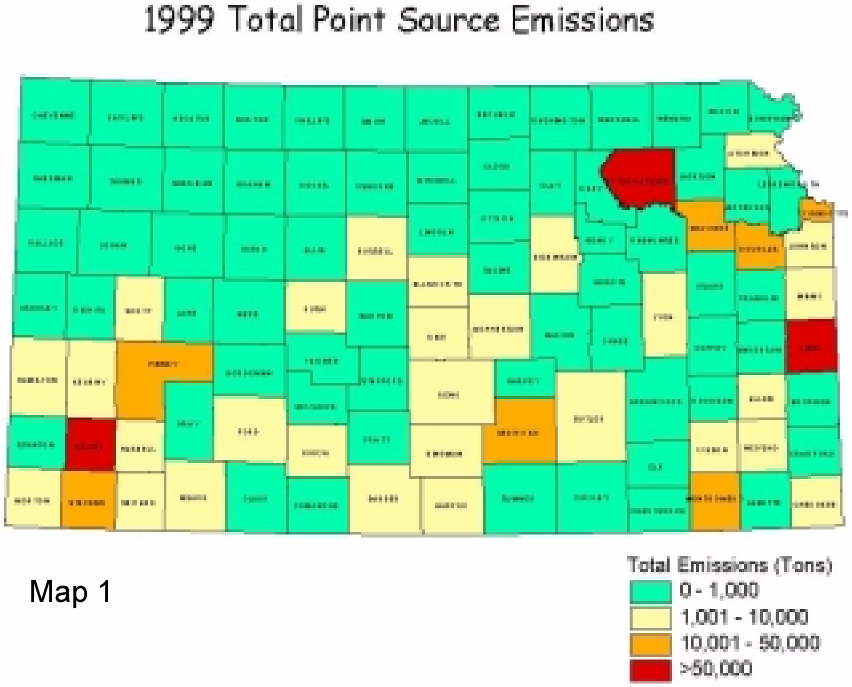
Graph 9

Graph 9 shows the total reported emissions (in tons) across the state for the main pollutants from 1995 through 1999.

Information is collected for all six pollutants for which national ambient air quality standards have been established as well as hazardous air pollutants. Class I facilities are required to calculate their actual emissions using accepted emission factors or provide actual data from continuous emissions monitors. Class II facilities provide the Bureau with operating information that allows actual emissions to be calculated using emission factors. The inventory information is reviewed for quality assurance purposes and forwarded to the Environmental Protection Agency (EPA). The EPA combines the point source information with data for emissions from area, mobile and natural sources to create a complete emissions inventory for the state. This is combined with data for other states to create a national emissions inventory.

Point sources are facilities that process or handle raw materials or manufacture goods and emit air pollutants as a result. Examples of point sources include: chemical plants such as refineries; manufacturers; grain processing or storage; natural gas compressor stations; and printers. Point sources such as these whose emissions exceed certain thresholds are required to obtain a permit from the Department. Map number 1 shows the total point source emissions by county in 1999. Maps 2 and 3 show point source totals by county for both NO_2 and VOC's (pages 24 and 25).

Area source emissions are those from facilities or activities whose individual emissions do not qualify them as point sources, and are therefore not subject to permitting requirements. Examples of area



Map 1

source emissions include: household products; open burning; asphalt paving; painting and lawn and garden equipment. Mobile source emissions result from on-road use of vehicles such as automobiles, motorcycles and trucks. Off road vehicle emissions such as tractors, boats, and lawnmowers are considered area sources. Biogenic and geogenic emissions are those resulting from natural activities such as forests, agriculture and soil erosion.

Emission inventories have multiple uses on both the federal and state level. Some examples follow:

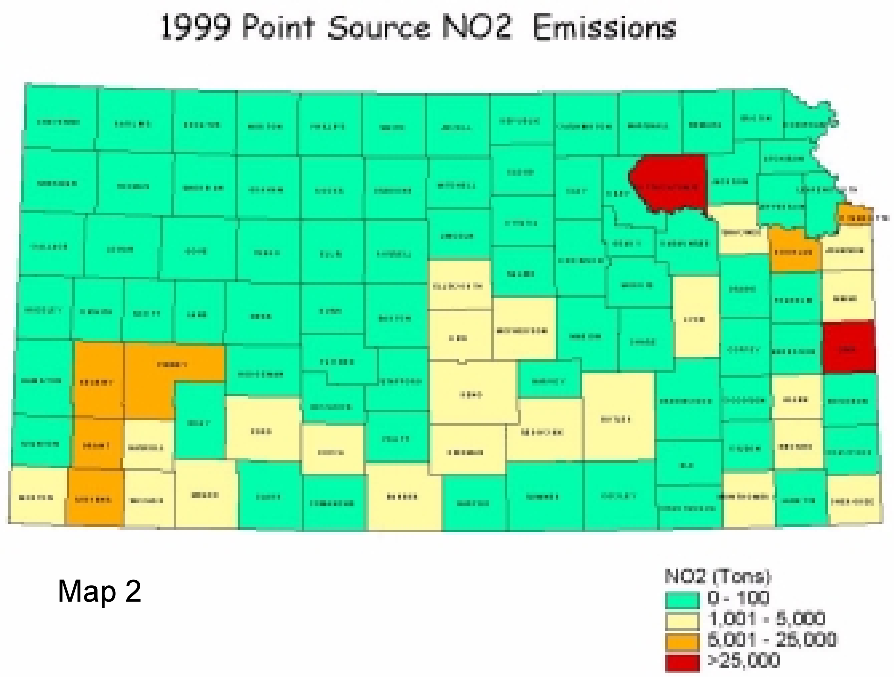
√ Preparation of state implementation plans for areas that are in nonattainment for a national ambient air quality standard

√ Input into the air pollutant modeling process

√ Input for health risk assessment studies or environmental impact assessments

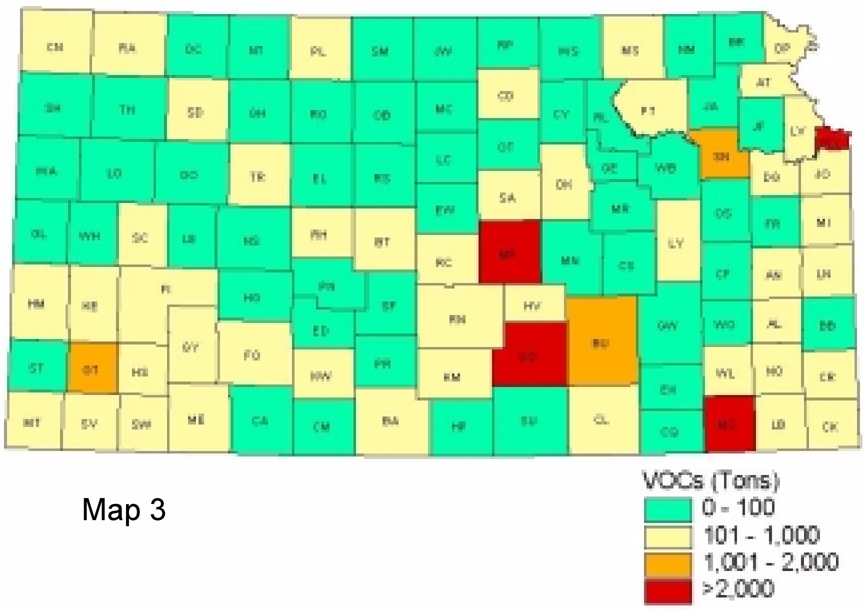
√ Basis for construction permit reviews

√ Siting ambient air monitors



Map 2

Point Source Volatile Organic Compounds (VOCs) Emissions for 1999



Map 3

√ Assessing the effectiveness of air pollution control policy

√ Basis for emission fees

The Bureau of Air and Radiation has traditionally conducted the point source portion of the emissions inventory and relied upon EPA to complete the area, mobile and natural source components. The Bureau is increasingly taking a more active role in reviewing the data prepared by EPA and developing our own data for those categories where our local knowledge can provide a better quality product. The importance of developing the best inventory possible is driven home by the increasing use of inventory data in regional air pollutant modeling.

In 1993, the Kansas emission inventory program began collecting emission fees. These emission fees are collected to support air program activities as provided for in the Clean Air Act Amendments. An eighteen dollar per ton emission fee was established by the bureau for 1993 air emissions and twenty dollars a ton for 1994 air emissions. In 1995 the fee was reduced to fifteen dollars per ton and remained at fifteen dollars through 1996. In 1997 the fee was again reduced to thirteen dollars per ton and will remain at thirteen dollars through emission year 2000.

What Can I Do?

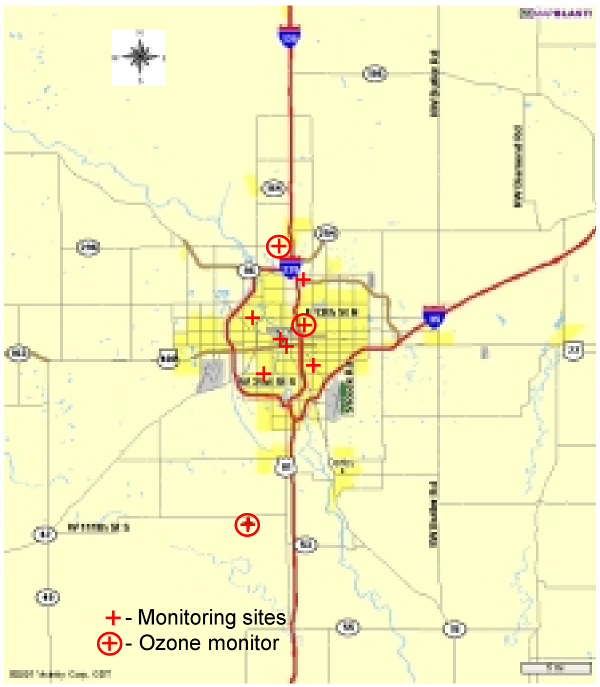
Here's how you can help protect clean air in Kansas.

At Home.......

- Use a charcoal chimney instead of charcoal lighter fluid.
- Consider purchasing an electrical mower, or push mower if your lawn is small.
- If you use a gas mower, keep it tuned and wait until evening to mow your lawn.
- Use water-based paints rather than oil-based.
- Limit use of pesticides, paint thinners, solvents and petroleum products.
- Keep solvents and petroleum products tightly capped.

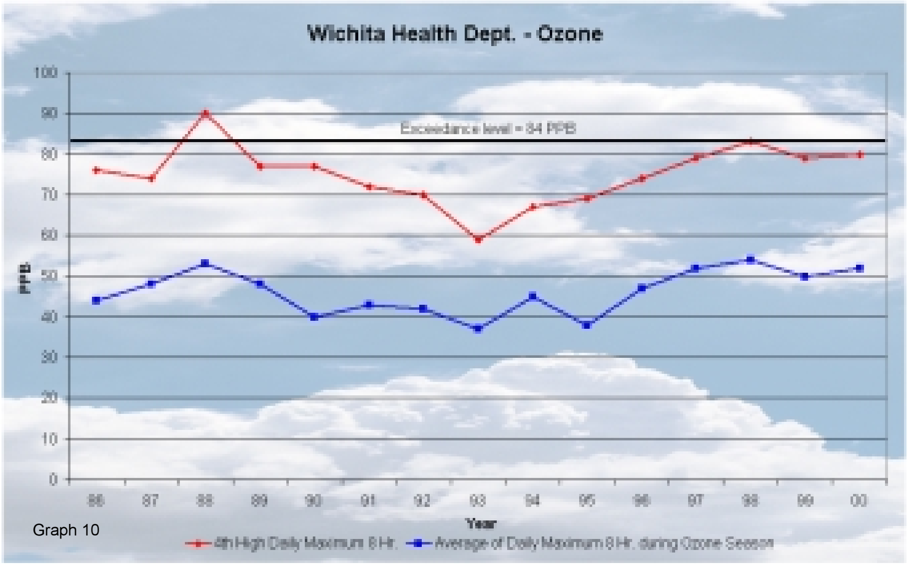
Wichita Ozone

The Wichita-Sedgwick County area has been experiencing a moderate increase in monitored levels of ozone over the past decade. While the levels rarely approached the 1-hour ozone standard of 120 parts per billion, the monitoring results are cause for concern when compared to the new 8-hour ozone standard of 80 parts per billion. Graph 10, on page 27, shows the ambient ozone monitoring trends for the monitoring site located at the Health Department. Additional monitoring sites are located south of Wichita at Peck and north at Park City (Graph 11, page 27).



The graph shows the ozone values expressed in the form of the standard used to determine an exceedance, as well as the average of the daily maximums during the ozone season. The first set of values are important in evaluating how the area is doing in regard to attainment of the National Ambient Air Quality Standard. The latter values are better indicators of how severe the ozone season was in a given year. The 8-hour values for the Wichita Health Department monitor for the last three years show how close Wichita is to exceeding the 8-hour standard once the remaining legal issues surrounding the standard are resolved.

When EPA issued the 8-hour standard in July of 1997, local officials in Wichita-Sedgwick County recognized the need to take a proactive stance and agreed to participate in an EPA program known as the Voluntary Ozone Reduction Consortium. The purpose of the program is to develop voluntary ozone reduction strategies to attempt to stop the upward trend in ozone values for those cities across the country with ozone trends similar to those in Wichita. The social and economic impacts of an ozone nonattainment designation for a city like Wichita would be severe. An implementation plan would be developed for the area addressing issues such as: additional regulations to provide for emission reductions from point sources; mobile source emission reductions; improving the emissions inventory of all air pollution sources; and, ensuring



Graph 10

What Can I Do?
Here's how you can help protect clean air in Kansas.

At The Service Station.......

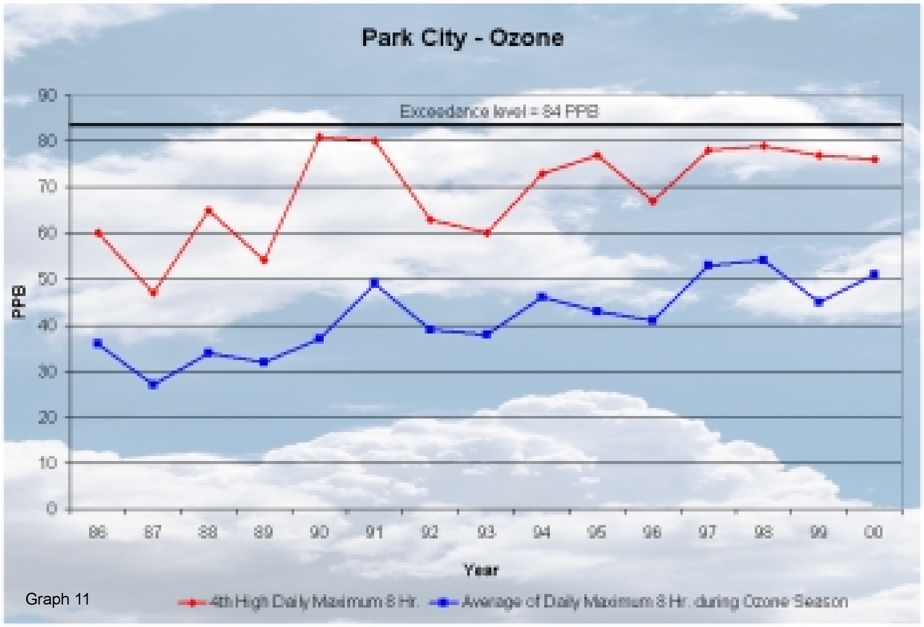
- Avoid spills to reduce gas fumes.
- Don't "top off" your gas tank.
- Tighten your car gas cap.
- Wait until evening to fill your car with gas.
- In summer, use plain water to clean your windshield.

At Play.......

- Plan activities that don't require motors or gasoline. Hike, bike, skate, swim, canoe, sail, golf, or play tennis and team sports.
- Keep engines tuned in boats and other recreational vehicles.

that the transportation plan conforms with the air quality improvement plan.

In 1999, local officials formed a work group of individuals representing industry, government, education and the public to address the problem. Much of the first year was spent educating group participants about ozone formation, monitoring and potential reduction strategies. In 2000, a report recommending ozone education and control strategies has been prepared for submission to the governing body. In addition, a contractor has been selected to conduct an emissions inventory for area and mobile sources to better understand the sources of ozone precursors in the county and to develop a baseline against which reductions can be measured. In addition, local officials will be working to educate the public and small businesses about the role they play in ozone formation and actions that can reduce emissions of ozone precursors.



Graph 11

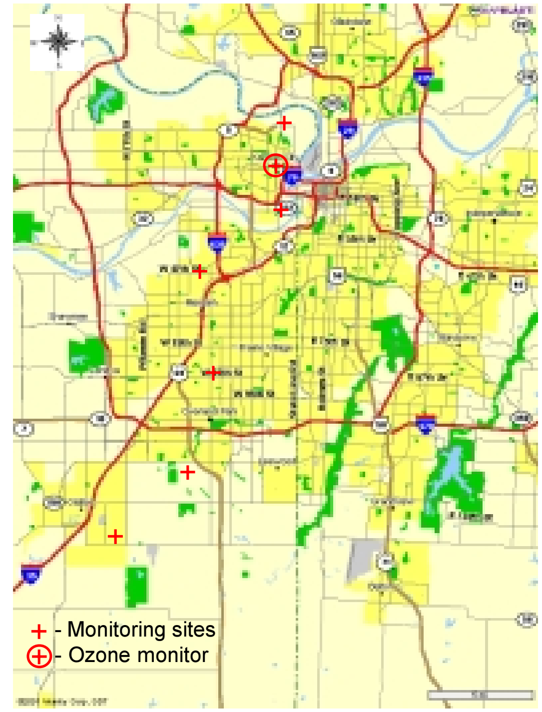
Kansas City Ozone

The federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to promulgate National Air Quality Standards (NAAQS) for six classes of criteria pollutants. The six criteria pollutants are: ozone, particulate matter, sulfur oxides, nitrogen oxides, carbon monoxide, and lead. The CAA further requires that if any area fails to attain the standard for any criteria pollutant, the respective state must develop and implement a State Implementation Plan (SIP). The map on the right shows the location of the ozone monitor in Kansas City, KS as well as additional sites for other pollutants.

The Kansas City Metropolitan Area (KCMA) was determined to be in violation of the ozone NAAQS in the 1970's. Subsequently, the state of Kansas developed and implemented an ozone SIP for the Kansas side of the KCMA, which includes the counties of Johnson and Wyandotte. EPA approved the 1979 Kansas SIP, which projected that the KCMA would meet the ozone NAAQS by December 31, 1982. However, in calendar years 1983 and 1984, the ambient air monitor data for the region revealed that violations of the ozone NAAQS had occurred. These violations required the state to make revisions to the 1979 SIP.

Photo by: Gary Ficklin, KDHE

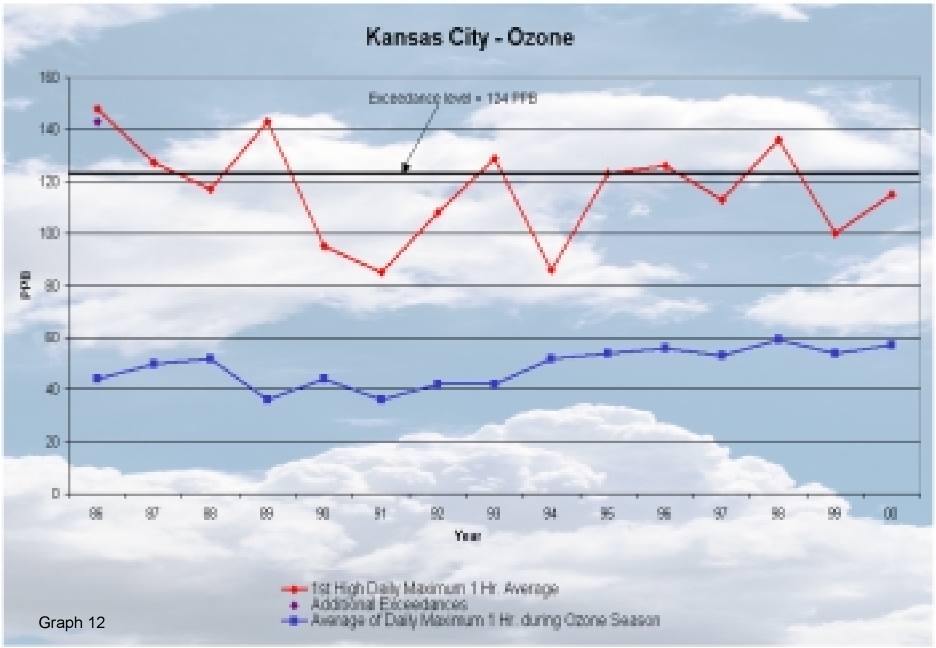
Accordingly, the SIP was revised to include additional control measures for the region. With further reductions of volatile organic compound (VOC) emissions in the area, the new SIP projected the area would be in attainment of the ozone NAAQS by December 31, 1987. In November 1989, the SIP was fully approved by the EPA. However, efforts to redesignate the area to attainment were halted when the area experienced several exceedences of the ozone standard in 1988.



Kansas and Missouri continued monitoring for ozone in the area. At the end of 1991, sufficient monitoring data was available which demonstrated that the area had attained the standard. Under the provisions of the federal Clean Air Act Amendments of 1990, KDHE revised the SIP for the KCMA to reflect that the KCMA had achieved the ozone standard. A Maintenance Plan, which the EPA approved on June 23,1992, contained documentation that supported the redesignation of the area to attainment and provided for contingency measures if violations of the ozone standard occurred in the future.

In the summer of 1995, the Midwest experienced a period of severe hot weather, with temperatures exceeding 100° for several days. During this hot spell, the KCMA recorded a violation of the ozone standard at the Liberty, Missouri monitor-

Which of the following is the biggest polluter of our air? a. city buses b. passenger cars and light trucks c. over-the-road trucks

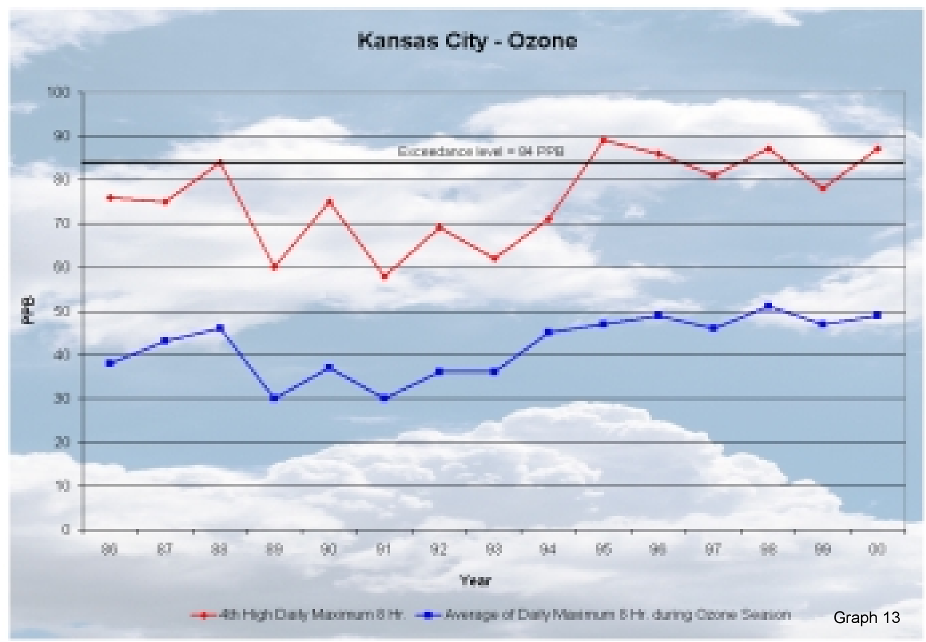


Graph 12

To address the short-term need to control emissions, Kansas promulgated a rule to limit the Reid Vapor Pressure (RVP) of the gasoline sold during the summer months in the KCMA to 7.2 pounds per square inch (psi). This regulation became effective May 2, 1997. To address the longer term need to reduce VOC and nitrogen oxide emissions, the Mid-America Regional Council's Air Quality Forum (AQF), comprised of representatives from local governments, business, health, and environmental organizations, agreed to examine various alternative control strategies and recommended the following measures: (1) expanding public education efforts; (2) low RVP gasoline; (3) motor vehicle inspection and maintenance; (4) seasonal no-fare public transit; (5) a voluntary clean fuel fleets program; and (6) additional transportation control measures. The motor vehicle inspection and maintenance program was rejected by the Missouri Air Conservation Commission.

ing site for the three-year period from 1993 to 1995. The recorded violation required KDHE to implement the contingency measures contained in the Maintenance Plan.

The contingency measures included 1) emissions offsets, 2) stage II vapor recovery or enhanced vehicle inspection and maintenance programs, 3) transportation control measures achieving a 0.5% of area wide VOC emissions reduction, and 4) an updated comprehensive emissions inventory for the Kansas City Metropolitan Area. In the weeks following the recorded exceedances, EPA was asked to provide guidance on the implementation of the contingency measures contained within the Maintenance Plan. The EPA responded by informing the states that they had flexibility in substituting other control measures beyond those specifically listed provided they resulted in equivalent emission reductions to those control measures contained in the plan.



Graph 13

The combination of nitrogen oxides and hydrocarbons in the presence of sunlight causes? a. global warming b. acid rain c. smog (ozone)

In late July 1999, the governors of Kansas and Missouri petitioned the U.S. Environmental Protection Agency to allow the Kansas City area to opt into the reformulated gasoline (RFG) program to reduce automobile emissions and help the KCMA achieve the reductions in pollutants necessary to meet their obligations under the ozone plan. On January 4, 2000, a U.S. Court of Appeals ruled RFG could not be introduced into areas such as Kansas City. According to the court, the introduction of RFG exceeded the EPA's authority under the federal Clean Air Act.

Photo by: Justus Welker, Unified Government of Wyandotte County-Kansas City, Kansas Health Department

Subsequently, the states proposed, and MARC concurred, that 7.0 RVP gasoline and a low vapor pressure solvent rule for cold cleaning operations be implemented in the KCMA to satisfy the contingency measures. Both Kansas and Missouri have rules in place requiring 7.0 RVP gasoline be sold each summer in the KCMA, beginning June 1, 2001. Both states are in the process of adopting the low vapor pressure solvent rule for cold cleaning operations.

Kansas and Missouri are also in the process of reviewing their maintenance plans to assure the plans are adequate to maintain the NAAQS for ozone in the KCMA. The reviews, and any modifications, will be submitted to EPA in 2002. This review will also require the states to update their emissions budgets for the KCMA.

At the same time, EPA has developed a more stringent eight-hour ozone standard for the country. Although this new standard is now being challenged in federal court, it is possible that if the Kansas City area continues its concentrations of ozone as in recent years, it will violate the new ozone standard, if and when it is implemented. The graphs on page 29 contain a combination of data from the ozone monitor that was located at the Unified Government Health Dept. through March of 1999. This monitor was relocated to the JFK Community Center in late March 1999 and began recording ozone readings on April 1, 1999.

About the Bureau

The mission of KDHE's Bureau of Air and Radiation is to protect the public from the harmful effects of air pollu tion and prevent damage to the environment from releases of air contaminants. The bureau strives to achieve this mission through monitoring, permitting, planning, education, and compliance activities. These activities are conducted by four sections of the bureau and four local agencies. The bureau also carries out a comprehensive radiation protection program.


Photo by: Doug Watson, KDHE

Air Construction Permit Section

Air Construction Permit Section staff receive and review construction permit applications for emissions sources to ensure that they minimize the release of air contaminants and meet all requirements. The applications range from approvals in cases where proposed emissions are relatively small to Prevention of Significant Deterioration (PSD) permits where facilities with substantial emissions are being constructed or modified. The Unified Government Health Department assists in the permitting process by issuing construction and operating permits in Wyandotte county.

Air Operating Permits and Compliance Section

The section processes operating permit applications for facilities requiring either Class I or Class II operating permits. Class I operating permits combine all applicable air quality requirements in one permit to clarify for both the facility and the public what is required to comply with the air pollution regulations. Section staff also use a combination of education, technical assistance and formal enforcement actions to ensure facilities subject to the air quality regulations comply with applicable requirements. Staff from KDHE's district offices and the four local agencies conduct inspections and forward the results to the compliance section for review and response. When a source violates an air quality requirement, the staff works with the facility to correct the problem or, in severe cases, takes formal enforcement action.

Monitoring, Inventory and Modeling Section

The Air Monitoring Section staff work with three local agencies to operate an air monitoring network that provides air quality data from 25 sites around the state. The data is analyzed to determine compliance with federal standards and to evaluate air quality trends. Staff members also conduct an annual inventory of pollutants emitted from permitted facilities and other sources for the entire state. The section also utilizes monitoring and emission inventory information to conduct air quality modeling to evaluate the effectiveness of air pollution control strategies in areas such as the Kansas City metropolitan area.

Asbestos, Right-to-Know & Radiation Section

The Radiation Control Program includes two program areas. The environmental radiation surveillance program has the purpose of detecting, identifying, and measuring any radioactive material released to the environment resulting from the operation of Wolf Creek Generating Station and radioactive materials and X-Ray control. The radioactive materials and X-Ray control program regulates the use of ionizing radiation in Kansas. The asbestos program in this section monitors the removal of asbestos from building renovation and demolition projects and issues licenses to asbestos workers to ensure trained personnel conduct removal activities. The Right-to-Know program receives information regarding chemical storage and releases.

Future Activities

Supreme Court Rules on EPA's New Ozone Standard

The United States Supreme Court recently ruled on a challenge to the United States Environmental Protection Agency's (EPA's) authority to adopt ambient air quality standards (the concentration in the outdoor air at which a pollutant causes health or other environmental problems). In 1997, EPA adopted regulations which set the concentration for ground-level ozone at an 8-hour average of 0.08 parts per million (ppm). The new 8-hour ozone standard was meant to replace the existing 1-hour ozone standard in those areas of the country which complied with the 1-hour standard and co-exist with the 1-hour standard in those areas that did not meet the 1-hour standard. (EPA also specified a concentration for particulate matter at that time which was also challenged. Only ozone is being addressed in this section.)

Ground-level ozone should not be confused with the ozone layer in the stratosphere. Ground-level ozone is associated with smog and is a problem primarily found in large, metropolitan areas, though recent studies have demonstrated that ozone and some pollutants contributing to ozone formation in a particular area can come from hundreds of miles away. On the other hand, the ozone layer in the stratosphere reduces the amount of harmful ultraviolet rays reaching the earth's surface. The saying, "Good up high, bad near by," serves as a reminder that ozone in the stratosphere is beneficial while ozone near the ground is harmful.

EPA's regulations setting the new 8-hour ozone standard were challenged in the U.S. Court of Appeals for the District of Columbia (DC Court). Without deciding all issues brought before it, the DC Court ruled that EPA relied upon an interpretation of the Clean Air Act that resulted in an unconstitutional delegation of legislative powers and remanded the standard to EPA for reconsideration. EPA appealed the DC Court's decision to the U.S. Supreme Court. In March of 2000, the Supreme Court reversed the DC Court.

The Supreme Court's decision included three major points: 1) that EPA's interpretation of the Clean Air Act was not unconstitutionally broad and that EPA had the authority to set the 8-hour standard; 2) that EPA did not have to include costs when setting an ambient air quality standard (cost is considered when implementing the standard); and 3) that EPA must provide additional justification for its reliance on Subpart 1 of Part D, Title I of the federal Clean Air Act instead of a Subpart 2, for purposes of implementing the 8-hour ozone standard.

The case will now go back to the DC Court which must issue a decision consistent with the Supreme Court's decision. The DC Court will also have to rule on those issues which it didn't decide when it ruled EPA's setting of the standard was unconstitutional. Exactly what issues must still be decided, whether the parties to the lawsuit will be required to file additional briefs, and whether the parties will be required to make oral arguments before the DC Court are still not clear. Once the DC Court issues its final ruling the matter will go back to EPA to repropose the standard in compliance with the DC Court's decision. With so many issues remaining, it appears the matter of EPA's proposed 8-hour standard is still far from being resolved.

The area of Kansas most directly affected by EPA's 8-hour ozone standard is the Kansas City area. Air monitors located in the Kansas City area have recorded violations of the proposed 8-hour ozone standard. In mid-2000, the governor of each state was required to submit to EPA a recommendation regarding which areas of the state met the proposed standard and which didn't. Governor Graves recommended that all counties in Kansas, except Johnson and Wyandotte, be designated as "attainment/unclassifiable" for the proposed 8-hour standards. Johnson and Wyandotte counties, being part of the Kansas City metropolitan area, were recommended as not attaining the proposed 8-hour standard. EPA is considering whether to include Leavenworth County and Miami County as nonattainment since both are within the Kansas City MSA (metropolitan statistical area). EPA is required to discuss with the state any changes it proposes to the designations before EPA can finalize the designations. In addition, monitors in other areas of the state, such as the Wichita area, show that ozone concentrations are increasing and, if actions aren't taken to reduce ozone formation, will eventually exceed the proposed 8-hour ozone standard.

Signature Building

On July 8, 1999, state and city leaders held a ground-breaking ceremony for the two year construction of the new Signature State Office Building at Tenth and Jackson Streets. Within this grand structure exists practical organization and modern construction techniques. The 300,000 square foot building stands five stories high with a full garden level and penthouse. It was constructed with cast-in-place concrete and 1,600 tons of reinforcing steel. The insulated Derbigum roof system, low-e glass windows, and state of the art mechanical and electrical controls with steam heat allow for quality environmental control.

The Kansas limestone cladding on the modern structure is from Cottonwood Falls, Kansas, and blends in nicely with the historic design of the Statehouse and other buildings in the Capitol Complex.

It has been Governor Graves' goal to consolidate as many state agencies as possible into the downtown Topeka area, particularly the Capitol Complex. This will provide citizens with one place to stop for state business. The opening of the Signature Building in the summer of 2001 will help achieve Governor Graves' goal. The four agencies that will be located in the Signature State Office Building are the Kansas Department of Health and Environment, Department of Administration, Department of Commerce and Housing, and the Kansas Board of Regents.


Photo by: Doug Watson, KDHE

Regional Planning and Cooperation

Historically, air pollution control programs evaluated air pollution on a county, multi-county or statewide basis. Today, Bureau of Air and Radiation staff are frequently called upon to evaluate air pollution issues on a regional or national basis. Pollutants such as ozone and fine particulate matter or their precursors can travel in the atmosphere for long distances, affecting people and the environment far removed from their origin. One example of the Bureau's regional approach to resolving air pollution is participation in a multi state group formed to address regional haze caused by fine particulate matter.

The Bureau represents the State of Kansas as a member of the Central States Regional Air Planning Association (CENRAP). The association has been established in response to a federal program to reduce visibility impairment in areas such as National Parks and Wilderness Areas. Kansas is working jointly with neighboring states to provide for the placement of additional monitors; develop a shared emission inventory; and, to conduct modeling to help identify strategies that will reduce the haze. These strategies will be incorporated into a State Implementation Plan (SIP) to be filed with the EPA.

The Bureau is currently in the phase of installing new monitors that collect data regarding the chemical make up of fine particles in the air. One monitor is to be installed at Cedar Bluff State Park and a second is planned for the Flint Hills region of east central Kansas. The Sac and Fox Nation of Missouri located in Northeast Kansas are also planning to operate a monitor on tribal land near the Nebraska border. The monitoring data from these and other sites will be used to ensure the computer models are accurately predicting pollutant levels.

Bureau staff are also working with other members of CENRAP to determine what emission inventory information will be required for input into the model. This information will be gathered from industrial sources or developed by reviewing population, vehicle miles traveled and other surrogates for non-industrial emissions. The type of computer model to be used and the necessary inputs for the model will be reviewed to ensure sufficient time to gather the information. The monitoring, emission inventory, and modeling activities will take place over the next two to three years. The final step will be to determine appropriate strategies for pollution control and incorporate them into a SIP for submission to EPA. It is expected that the joint effort underway to address the regional haze issue will serve as a model for addressing future air pollution problems that cross state and international borders.

Public Education

The Bureau is continuing to expand public education efforts, particularly in those areas with the greatest potential to have problems meeting the standards. If a city fails to meet the standards, public awareness of the ways we all contribute to air pollution is critical. Many voluntary efforts aimed toward vehicle maintenance, use of public transportation systems, and other relatively simple changes can lead to air quality improvements. Before these can be successfully implemented, the public needs to recognize the role they play in creating pollution and the ways they can help prevent it. The Bureau is developing posters to distribute to schools, businesses and other groups to spread this message. In addition, the bureau is in the process of updating the web site to include a broad range of topics regarding causes of air pollution, air pollutant levels in the state, and steps the public can take to minimize those levels. Anyone wishing to receive additional copies of this report or air quality posters for distribution should contact the Bureau at (785) 296-6024.

Glossary

Air Quality Standards: The level of selected pollutants set by law that may not be exceeded in outside air. Used to determine the amount of pollutants that may be emitted by industry.

Attainment Area: An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Carbon monoxide (CO): A poisonous gas that is odorless, colorless and tasteless. At low levels it causes impaired vision, loss of manual dexterity, weakness, and mental dullness. At high levels it may cause vomiting, fast pulse and breathing followed by a slow pulse and breathing, then collapse and unconsciousness.

Particulate matter (PM_{10} and $PM_{2.5}$): One of the "criteria pollutants," PM_{10} particles are 10 microns or smaller in diameter. The pollutant increases the likelihood of chronic or acute respiratory illness. It also causes difficulty in breathing, aggravation of existing respiratory or cardiovascular illness and lung damage. In addition it causes decreased ability to defend against foreign materials. New laws have just been passed regulating $PM_{2.5}$, an even smaller and more harmful class of fine particles less than 2.5 microns in diameter. Kansas is beginning to monitor its concentrations.

Inversion: An atmospheric condition caused by increasing temperature with elevation, resulting in a layer of warm air preventing the rise of cooler air trapped beneath. This condition prevents the rise of pollutants that might otherwise be dispersed. Trapping pollutants near the ground increases ozone to harmful levels.

Lead (Pb): Airborne lead appears as dust-like particles ranging from light gray to black. Low doses may damage the central nervous system of fetuses and children, causing seizures, mental retardation and behavioral disorders. In children and adults, lead causes fatigue, disturbed sleep and decreased fitness, and it damages the kidneys, liver and blood-forming organs. It is suspected of causing high blood pressure and heart disease. High levels damage the nervous system and cause seizures, comas and deaths.

National Ambient Air Quality Standards (NAAQS): Standards set by the U.S. Environmental Protection Agency (EPA) that limit the amount of six air pollutants allowed in outside air. These six are carbon monoxide, inhalable particles, lead, nitrogen dioxide, ozone and sulfur dioxide. The limits are based on what is considered safe for humans to breathe.

Nitrogen dioxide (NO_2): A poisonous, reddish-brown to dark brown gas with an irritating odor. It can cause lung inflammation and can lower resistance to infections like bronchitis and pneumonia. It is suspected of causing acute respiratory disease in children.

Nonattainment area: A region in which air monitors detect more of a pollutant than is allowed by the National Ambient Air Quality Standards set by the U.S. EPA. The U.S. EPA may designate a region as a "nonattainment area" for that pollutant.

Ozone (O_3): A colorless gas with a pleasant odor at low concentrations. The layer of ozone in the stratosphere protects the earth from the sun's harmful rays. Ground-level ozone is a summertime hazard produced when hydrocarbons from car exhaust and other fumes mix in the presence of sunlight with oxides of nitrogen from power plants and other sources. Ozone is more easily recognized in smog, a transparent summer haze that hangs over urban areas. The result is a gas that aggravates respiratory illness, makes breathing difficult and damages breathing tissues. Victims include people with lung disease, the elderly, children and adults who exercise outside.

Ozone Violation: **One-Hour Standard** - Four or more exceedances of the federal ozone standard occurring in a three-year period at the same monitoring site. **Eight-Hour Standard** - Average (over the most recent three years) of the annual fourth highest daily maximum 8-hour average ozone concentration is greater than 0.08 ppm.

Reformulated Gasoline (RFG): A fuel blend designed to reduce air toxins and volatile organic compound (VOC) emissions by decreasing the amount of toxic compounds such as benzene, lowering the evaporation rate and increasing the amount of oxygenate blended with the fuel.

Smog: Dust, smoke, or chemical fumes that pollute the air and make hazy, unhealthy conditions (literally, the word is a blend of smoke and fog). Automobile, truck, bus, and other vehicle exhausts and particulate matter are usually trapped close to the ground, obscuring visibility and contributing to a number of respiratory problems.

State Implementation Plan (SIP): A plan submitted by a state or local agency to the Environmental Protection Agency for complying with national air quality standards.

Sulfur Dioxide (SO_2): A colorless gas with a strong, suffocating odor. Causes irritation of the throat and lungs and difficulty in breathing. It also causes aggravation of existing respiratory or cardiovascular illness.

Photo by: Tom Gross, KDHE

Air pollution affects our ____.   a.heart b. liver c. bones d. lungs e. all of the above

AGENCIES

Environmental Protection Agency
Region 7
901 North 5th Street
Kansas City, Kansas 66101
www.epa.gov/region7/

Johnson County Environmental Department
Pollution Control Division
Southlake Tech. Center Building #4
11180 Thompson Avenue
Lenexa, Kansas 66219

Kansas Dept. of Health and Environment
Division of Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366
www.kdhe.state.ks.us/bar

Mid-America Regional Council (MARC)
600 Broadway, 300 Rivergate Center
Kansas City, MO 64105
www.marc.org/

Shawnee County Health Agency
1615 West 8th Street
Topeka, Kansas 66606

Unified Govt. of Wyandotte County-KC, Kansas
Health Dept.
619 Ann
Kansas City, Kansas 66101
www.toto.net/daq

Wichita-Sedgwick County Dept. of Community Health
1900 East 9th Street
Wichita, Kansas 67214
www.wichitagov.org/health/

Answers:

Pg. 14 - c. 1990
Pg. 18 - d. stratosphere
Pg. 21 - a. weather
Pg. 22 - a. NO_x
Pg. 26 - b. creating a compost pile
Pg. 27 - a. true
Pg. 28 - b. passenger cars and light trucks
Pg. 29 - c. smog (ozone)
Pg. 30 - b. particulate matter
Pg. 31 - d. all of the above
Pg. 32 - b. April 22
Pg. 34 - d. 50%
Pg. 36 - e. all of the above

The following BAR staff contributed to the 2000 annual report:
Doug Watson, editor and layout, Tom Gross, Scott Weir, Jim Stewart, Fred Diver, and Mike Martin.